

Docket No. 1374.43736X00
Serial No. 10/849,196
August 30, 2006

REMARKS

Reconsideration and allowance of this application, as amended, is respectfully requested.

This Amendment is in response to the Final Office Action dated December 30, 2005.

By the present Amendment, claim 23 has been canceled, without prejudice, to thereby obviate the 35 USC §112, first paragraph, rejection. Also, minor amendments have been made to claim 20 solely for purposes of clarifying the claim language (to avoid possible interpretation of the claim limitations as "means plus function limitations). With regard to these changes, it is noted that they will not require a further search or substantial further consideration by the Examiner, and, as such, it is respectfully requested that these amendments be entered solely for purposes of clarification of the Applicant's intention, either for purposes of placing the application in condition for allowance based upon the following comments or in better form for Appeal.

Turning to the merits of the present claimed invention, it is noted that the present invention is directed to providing an improved semiconductor device to overcome certain problems in the prior art discussed in the Background of the Invention. In particular, a general purpose of the present invention is to provide an improved arrangement for increasing the number of terminal portions (such as the first and second terminal portions of the present invention shown in the attached Sketch 1) to improve the function and performance of the semiconductor device. However, as discussed in the Background of the Invention, this is difficult in prior art structures because of the requirement for reducing the package size of the semiconductor device. In the past, in order to obtain a multi-pin structure without

Docket No. 1374.43736X00
Serial No. 10/849,196
August 30, 2006

substantial changes in package size, micro-fabrication of the leads has been utilized. However, this tends to decrease the area for the terminal portions to an undesirably small level. To enlarge the widths of the terminal portions of the leads selectively, such terminal portions have been arranged in a staggered or zig zag manner along an arranged direction of the leads to ensure a predetermined area for the terminal portions in a multi-pin structure.

However, one problem which has occurred in this prior art arrangement is that the terminal portions positioned on the semiconductor chip side leave a clamp portion of a molding die which clamps the opposite end sides of the leads vertically, such that the adhesion between an inner surface of the cavity in the molding die and the terminal portions of the leads becomes deteriorated. In addition, since the front end portions of the leads (that is, the end portions on one side of each of the plural leads) are free, the leads are likely to be displaced by the flow of resin which is injected into the cavity. An end result of this is that the terminal portions can be undesirably covered by a resin flash.

Accordingly, as defined in the independent claim 20 (and shown in Sketch 1 in the Appendix), in accordance with the present invention, the front end portions on one side of each of the plural second leads (e.g., 5a) are arranged inside the first terminal portions and fixed to the back surface of the semiconductor chip (e.g., also see Sketch 2). By virtue of this arrangement, the second terminal portions (e.g., 6a) of the leads that the front end portions on one side of each of the plural leads are fixed to the back surface of the semiconductor chip are formed at the semiconductor chip side of the structure.

Referring to Fig. 2, since the front end portions of the second leads are fixed to the back surface of the semiconductor chip, even if the terminal portions are

Docket No. 1374.43736X00
Serial No. 10/849,196
August 30, 2006

arranged in the staggered or zig zag manner along the direction of the leads, it is possible to substantially suppress the lowering of the pressure force of the terminal portions acting on the inner side of the cavity. Therefore, this arrangement of the second leads being attached to the back surface of the semiconductor chip makes it possible to prevent the problem of a terminal portion of the lead being covered with the resin flash.

Reconsideration and removal of the rejection of independent claim 20 and its dependent claims over the cited prior art to Mihara (USP 6,781,223) and Lee (USP 6,927,483) is respectfully requested. With regard to this, it is noted that the primary reference to Mihara does not teach an arrangement in which the terminal portions are arranged in a zig zag or staggered fashion along the arranged direction of the leads. The secondary reference teaches that the terminal portions (e.g., the first leads 120) on the semiconductor chip side and the terminal portions (e.g., second leads 130) forming the periphery of the resin sealing material are provided.

However, a careful study of Lee shows that the first leads 120 are not disposed between adjacent ones of the second leads 130. With regard to this, reference is made to the attached Sketch 3, which corresponds to Figs. 1A and 1B of Lee. As can be seen in this sketch, the first leads 120 (that is, the second terminal portions) are disposed on an extension line of the second leads 130 (corresponding to the first terminal portions).

As a result, even if the references of Mihara and Lee are combined (which is not suggested by either document), an arrangement such as shown in the attached Sketch 4 would be the end result. In such an arrangement, the second leads (e.g., the ground leads 6) would be arranged such that the front end portions on one side of each of the plural leads would be fixed to the back surface of the semiconductor

Docket No. 1374.43736X00
Serial No. 10/849,196
August 30, 2006

chip. In this arrangement, the clamping force would be transmitted to both of the terminals X and Y. However, in this arrangement, the first leads (e.g., the signal leads 3) would be positioned outside of the semiconductor chip, and, accordingly, it would be difficult to transmit the clamping pressure force to the terminal portion (M) which is positioned on the semiconductor chip side. Therefore, the problem of the terminal portion M of the lead being covered with resin flash would still be likely to occur.

In addition, it would take complete modification of Mihara to provide a terminal portion arrangement in a zig zag or staggered arrangement. This can be appreciated from studying the arrangement shown in Sketch 5. In such an arrangement, it would be difficult to transmit the clamping pressure force to the terminal portion A located on the semiconductor chip side. Therefore, once again, the terminal portion A would be most likely to be covered with the resin flash.

In summary, in the case of applying a staggered arrangement, there is no suggestion or motivation in either Mihara or Lee for the claimed overall arrangement which includes the fixing of a first or second lead to the back surface of the chip. In particular, there is no suggestion of such an arrangement together with forming the second terminal portion to either the first lead or the second lead. Quite to the contrary, such a complete modification of Mihara, whether considered alone or in combination with Lee, can only be envisioned based upon hindsight using the Applicant's own teachings. As indicated in the case of *in re Lee*, 61 USPQ 2d. 1430:

"It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to use that which the inventor taught against its teacher."

Docket No. 1374.43736X00
Serial No. 10/849,196
August 30, 2006

It is respectfully submitted that the present rejection is based on such an improper utilization of the Applicant's own teachings, and, as such, removal of this rejection is earnestly solicited.

If the Examiner determines that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 1374.43736X00).

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP.



Gregory E. Montone
Registration No. 28,141

GEM/vvr
1300 N. Seventeenth Street
Suite 1800
Arlington, Virginia 22209
Tel: 703-312-6600
Fax: 703-312-6666

August 30, 2006

Attachment: Appendix (Sketches 1-5)

Docket No. 1374.43736X00
Serial No. 10/849,196
August 30, 2006

APPENDIX